

<b>Number of units</b> 8	<b>T</b> 5	<b>Pr</b> 2	<b>Th</b> 3	Number of weekly hours 5	Annual System 30 weeks	<b>Al-Esra'a University College</b> <b>Department: Engineering of Refrigeration and Air Conditioning Technologies</b>
				<b>Thermodynamics-2</b>	<b>Second stage</b>	
<b><u>Course Objective</u></b>						
To study the principles of advanced thermodynamics, as the basis of refrigeration & air conditioning engineering and power plant subjects.						

Week	Topic	Practical subject	Notes
1	An overview of steam	Measurement of specific heat ratio of air	
2	dryness fraction measurements		
3	Steam power plants	Operating parameters of VCR	
4	Rankine- reheat cycle		
5	Regenerative cycle – dual cycle	Saturated vapor pressure and temperature relation	
6	High speed gas flow		
7	Properties of isentropic flows	Steam boiler efficiency	
8	Shock waves		
9	Supersonic nozzles	Determination the phase of the refrigerant for VCR system components	
10	Reciprocating compressors		
11	Dynamic analysis	Vapor dryness fraction measurement	
12	Clearance volume		
13	Multistage compressors	Determination of the evaporation latent heat	
14	Gas turbines		
15	Velocity triangles , frictional effects		

### Half-year Break

Half-year Break			
16	Gas turbines comparison	Determination of thermal efficiency for VCR cycle	
17	Steam turbines. Internal combustion engines		
18	Thermodynamics relations	EES software training	
19	Maxwell relations		
20	ClausiusClapyron relations		
21	Thermodynamic relations for du, dh, ds, Cp and Cv		
22	Real gases		
23	Compressibility factors		
24	Real gas equations of states		
25	Gas mixtures		
26	Gibbs- equations		
27	Daltons law and molar ratio		
28	Volumetric analysis		
29	Gravimetric analysis		
30	Combustion, heat of reaction		